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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>15 May 2009</u>.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-5,7,9,10,13 and 16-24</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-5, 7, 9, 10, 13, 16-24</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

1.   As per the instant Application having Application number 10/629,415, the

examiner acknowledges the applicant's submission of the amendment dated 5/15/09. At

this point, claims 1, 4, 20 and 23 have been amended, and claims 6, 8, 11-12, 14-15 have

been cancelled. Claims 1-5, 7, 9-10, 13 and 16-24 are pending.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

3.   **Claim 1-2, 9 and 19-24** are rejected under 35 U.S.C. 103(a) as being

unpatentable over Lubbers et al. (US 6,880,052) in view of Bridge (US 6,530,035).

4.   As per **claim 1**, Lubbers discloses A program storage device readable by a

computer embodying in a tangible medium one or more programs of instructions

executable by the computer to perform a method for dynamically expanding mirrored

virtual disks in a virtual disk storage system, the method comprising: **[increasing the size**

of virtual disks or logical units (LUNs) in an automated fashion in a copy set or

replication environment having source and destination LUNs wherein each LUN

has a RAID 0-5 data protection (col. 4, lines 44-67; col. 5, lines 59-62)]

receiving by a source virtual disk a request to dynamically expand the mirrored virtual

disks which include the source virtual disk and at least one destination virtual disk; **[host provides capacity requirements to storage controllers 105 and source LUNs are configured for host access wherein LUNs may be resized according to host requirement (col. 5, line 27-col. 6, line 5) the size of LUNs can be increased/resized in an automated fashion wherein the increase is automatically propagated to other members of a copy set (col. 4, lines 44-67)]**

associating additional storage with the mirrored virtual disks; **[size of LUNs increased by allocating more storage from physical devices (col. 5, line 51-col. 6, line 37; col. 8, lines 5-9)]**

increasing respective sizes of each of the at least one destination virtual disk **[Lubbers discloses "a copy set" is a set of member virtual disks where each member virtual disk is a replica of the others" (col. 8, line 57-col. 9, line 8) wherein a LUN may be resized and the resizing is automatically propagated to other members of the copy set (col. 4, lines 44-67; col. 6, lines 5-37)]** but does not disclose expressly these changes are implemented before reporting a new storage size of the source virtual disk; and reporting the new size of the source virtual disk

To further detail Lubbers, Bridge discloses receiving a request to resize a virtual disk, associating additional storage with the virtual disk and reporting the new sizes users and more specifically, resizing or changes the size of a logical unit are implemented before reporting a new storage size of the source virtual disk (or logical unit); and reporting the new size of the source virtual disk (or logical unit) **[expanding or shrinking logical volumes by adding or removing extents wherein when the logical volume is configured to a new size, the new size is reported in logical volume**

directory; thus allowing I/O operations are allowed on the logical volume (col. 16, line 32- col. 17, line 4; col. 20, lines 1-33) wherein the added or removed extents may be mirrored (col. 17, line 5-col. 18, line 58)].

Lubbers and Bridge are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the system of Lubbers which provides source and destination virtual disks in a copy set and resizes these virtual disks in an automatic fashion wherein any changes to a source virtual disk are propagated to the destination virtual disk and further explicitly expand the size or perform changes of size of the copy set of source and destination virtual disks of Lubbers and later reporting the size of the copy set or source and destination virtual disks in the same manner that Bridge first resizes a logical unit and later reports the changes to the logical unit by updating directory tables in order to allow I/O access to the virtual disks, since Bridge discloses this provides the advantage of dynamically accommodating to system requirement changes in a mirrored system configuration (col. 3, line 45-col. 4, line 59; fig. 9 and related text).

Therefore, it would have been obvious to combine Lubbers with Bride for the benefit of creating a system/method of resizing virtual disks to obtain the invention as specified in claim 1.

5.   As per claim 2 The program storage device of claim 1 wherein the request step of associating additional storage further comprises: creating an amount of storage by providing RAIDs on each subsystem that is associated with each component of a mirror set; assigning the RAIDs to a specific virtual disk for a mirror device; and **[Lubbers**

discloses each LUN has a specified data protection RAID 0-5 level wherein the data

protection level of source and destination may vary (col. 5, line 51-col. 6, line 5; col.

6, lines 16-37)]

specifying a size for the virtual disk and mapping the size of the virtual disk directly to all

components of the mirror set [Lubbers discloses the LUNs in a copy set are mirror

and are mapped to physical disks and each LUN has a specified RAID 0-5 level (col.

5, line 51-col. 6, line 37)].

6.   As per claim 9 . (previously presented) The apparatus of claim 23, wherein

creating an amount of necessary storage includes providing RAIDs on each subsystem

that is associated with each component of a mirror set, attaching the RAIDs to a specific

virtual disk for a mirror device and specifying a size for the virtual disk and mapping the

size of the virtual disk directly to all components of the mirror set [The rationale in the

rejection to claim 2 is herein incorporated].

7.   As per claim 19 The program storage device of claim 1, wherein a first of the

mirrored virtual disks has a different virtualization configuration from a second of the

mirrored virtual disks [Lubbers discloses source virtual disk and destination virtual

disk may each implement different data protection configurations (col. 7, line 64-col.

8, line 29; col. 5, line 51-col. 6, line 37)].

8.   As per claim 20 A method, comprising: receiving a request to dynamically resize

mirrored virtual disks, the mirrored virtual disks comprising a source virtual disk and a

set of destination virtual disks that includes at least one destination virtual disk;

associating additional storage with the mirrored virtual disks; reporting respective new

storage sizes of each destination virtual disk before reporting a new storage size of the

source virtual disk; and reporting the new storage size of the source virtual disk **[The rationale in the rejection to claim 1 is herein incorporated]**.

9.   As per claim 21. The method of claim 20, wherein the request is received by the source virtual disk **[Lubbers discloses host provides capacity requirements to storage controllers 105 and source LUNs are configured for host access wherein LUNs may be resized according to host requirement (col. 5, line 27-col. 6, line 5) wherein host writes to source LUNs (figs. 4-6 and related text)]**.

10.   As per claim 22 The method of claim 21, wherein, in the step of receiving, the request is received electronically from a host and, in the step of reporting the new storage size of the source virtual disk, the new storage size of the source virtual disk is reported to the host **[Lubbers discloses the size of source virtual disk becomes available for host writes, thus it is reported to host (col. 5, line 26- col. 6, line 5; col. 12, lines 38-51)]**. Bridge discloses **[expanding or shrinking logical volumes by adding or removing extents wherein when the logical volume is configured to a new size, the new size is reported in logical volume directory; thus allowing I/O operations are allowed on the logical volume (col. 16, line 32- col. 17, line 4; col. 20, lines 1-33) wherein the added or removed extents may be mirrored (col. 17, line 5-col. 18, line 58)]**.

11.   As per claim 23, Lubbers discloses An apparatus, comprising:

a set of mirrored virtual disks, including a source virtual disk and at least one destination virtual disk, the at least one destination virtual disk mirroring the source virtual disk, wherein the source and destination virtual disks have the same size; **[source and destination virtual disks (fig. 4 and related text; col. 7, line 64-col. 8, line 29)]**

a management module that includes a host side interface <u>adapted to</u> [*interpreted as intended use, See MPEP 2106 II-C*] communicating with host devices, through which the management module is<u> adapted</u> by logic <u>to</u> [*interpreted as intended use, See MPEP 2106 II-C*] report the size of the mirrored virtual disks and to receive a request to expand the mirrored virtual disks, and

a storage system interface <u>for</u> [*interpreted as intended use, See MPEP 2106 II-C*] communicating with the virtual disks that is <u>adapted to</u> [*interpreted as intended use, See MPEP 2106 II-C*] requesting the source virtual disk to expand and <u>to</u> [*interpreted as intended use, See MPEP 2106 II-C*] obtain reports of the size of the virtual disks from the source virtual disk; and logic <u>adapted to</u> [*interpreted as intended use, See MPEP 2106 II-C*] provide reports of the size of the source virtual disk to the management module through the storage system interface, **[capacity requirements to storage controllers 105 and source LUNs are configured for host access wherein LUNs may be resized according to host capacity requirements (col. 5, line 27-col. 6, line 5; col. 4, lines 44-67) the size/capacity of source virtual disk is available for host accesses and is thus reported (col. 7, line 64-col. 8, line 29)]**

satisfy an expansion request by creating an amount of necessary storage before changing the size that will be obtained by the management module in reports from the source virtual disk; and change the size that will be obtained by the management module in reports from the source virtual but does not disclose expressly these changes are implemented before reporting a new storage size of the source virtual disk; and reporting the new size of the source virtual disk

To further detail Lubbers, Bridge discloses receiving a request to resize a virtual disk, associating additional storage with the virtual disk and reporting the new sizes users and more specifically, resizing or changes the size of a logical unit are implemented before reporting a new storage size of the source virtual disk (or logical unit); and reporting the new size of the source virtual disk (or logical unit) **[expanding or shrinking logical volumes by adding or removing extents wherein when the logical volume is configured to a new size, the new size is reported in logical volume directory; thus allowing I/O operations are allowed on the logical volume (col. 16, line 32- col. 17, line 4; col. 20, lines 1-33) wherein the added or removed extents may be mirrored (col. 17, line 5-col. 18, line 58)]**.

Lubbers and Bridge are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the system of Lubbers which provides source and destination virtual disks in a copy set and resizes these virtual disks in an automatic fashion wherein any changes to a source virtual disk are propagated to the destination virtual disk and further explicitly expand the size or perform changes of size of the copy set of source and destination virtual disks of Lubbers and later reporting the size of the copy set or source and destination virtual disks in the same manner that Bridge first resizes a logical unit and later reports the changes to the logical unit by updating directory tables in order to allow I/O access to the virtual disks, since Bridge discloses this provides the advantage of dynamically accommodating to system requirement changes in a mirrored system configuration (col. 3, line 45-col. 4, line 59; fig. 9 and related text).

Therefore, it would have been obvious to combine Lubbers with Bride for the benefit of creating a system/method of resizing virtual disks to obtain the invention as specified in claim 23.

12.   As per claim 24 The apparatus of claim 23, further comprising: a host device adapted to send a request to the management module to expand the mirrored virtual disks **[Lubbers discloses the capacity requirements are sent from host storage device to controllers 105 and source and destination virtual disks are resized accordingly (col. 4, lines 44-67; col. 5, line 27-col. 6, line 5)]**.

13.   <u>Claims 3 and 17-18</u> are rejected under 35 U.S.C. 103(a) as being unpatentable over Lubbers et al. (US 6,880,052) in view of Bridge (US 6,530,035) as applied to claim 1 above, and further in view of Cabrera et al. (US 6,629,202).

14.   As per claim 3, the combination of Lubbers and Bridge disclsoes The program storage device of claim 2, but does not disclose expressly wherein the specifying a size for the virtual disk and mapping the size of the virtual disk is performed by an operating system.

Cabrera discloses specifying a size for the virtual disk and mapping the size of the virtual disk is performed by an operating system as **[logical volumes are mapped and resized under the control of the operating system (col. 8, lines 59-67; col. 10, lines 4-17; col. 11, line 50-col. 12, line 33)]**.

Lubbers, Bridge and Cabrera are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the combined system of Lubbers and Bridge to have the operating system perform the specifying a size for the virtual disk and mapping the size of the virtual disk as taught by Cabrera, since Cabrera discloses this would provide dynamic volume resizing without system disruption.

Therefore, it would have been obvious to combine Lubbers with Bridge and Cabrera for the benefit of creating a system/method to obtain the invention as specified in claim 3.

15.   As per claim 17 The program storage device of claim 1, further comprising: providing by the source virtual disk continuous availability for normal disk access operations between the step of receiving a request and the step of reporting the new storage size of the source virtual disk **[Lubbers discloses the host can continuously write to source (col. 12, line 38-col. 13, line 15)]**.

To further detail the combination of Lubbers and Bridge, Cabrera discloses **[logical volumes and their plex are dynamically mapped and resized under the control of the operating system without system disruption (col. 8, lines 59-67; col. 10, lines 4-17; col. 11, line 50-col. 12, line 33)]**.

Lubbers, Bridge and Cabrera are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the combined system of Lubbers and Bridge to have logical volumes and their plex are dynamically mapped and resized under the control of the operating system without system disruption as taught by Cabrera discloses since this

would provide faster and continuous access while configuring/reconfiguring logical

volumes.

Therefore, it would have been obvious to combine Lubbers with Bridge and

Cabrera for the benefit of creating a system/method to obtain the invention as specified in

claim 17.

16.   As per claim 18 The program storage device of claim 17, further comprising:

providing by the set of destination virtual disks continuous mirroring of the source virtual

disk between the step of receiving a request and the step of reporting the new storage size

of the source virtual disk **[Lubbers discloses each time data is written to source, a**

copy operation is scheduled to destination, wherein these copy operations can be

scheduled as needed and explains ongoing operations of copying data from the

source to the destination can be performed (col. 12, line 57-col. 13, line 15). Cabrera

further discloses data is continuously mirrored by first plex component (col. 11, line

50-col. 12, line 33)].

17.   **Claims 4, 7, 10, 13 and 16** are rejected under 35 U.S.C. 103(a) as being

unpatentable over Lubbers et al. (US 6,880,052) in view of Bridge (US 6,530,035) and

DeKoning (US 6,275,898).

18.   As per claim 4. (currently amended) Lubbers disclsoes A program storage device

readable by a computer embodying in a tangible medium one or more programs of

instructions executable by the computer to perform a method for dynamically resizing

mirrored virtual disks in a RAID storage system, the method comprising: **[resizing**

virtual disks or logical units (LUNs) in an automated fashion in a copy set or

replication environment having source and destination LUNs wherein each LUN

has a RAID 0-5 data protection (col. 4, lines 44-67; col. 5, lines 59-62)]

receiving a request to dynamically shrink mirrored virtual disks in the RAID storage

system, which include the source virtual disk and at least one destination virtual disk; and

resizing the at least one destination virtual disk **[Lubbers discloses resizing members of**

a copy set dynamically wherein any change made to one LUN member of a copy set

is automatically propagated to the other members (col. 4, lines 44-67; col. 6, lines 5-

37); wherein Applicant should note that the ability to resize inherently includes the

ability of shrinking (such as shrinking taught by Bridge and DeKoning in the

following discussion) the size of any of the members of the copy set].

Lubbers does not expressly disclose manipulating RAIDS in the RAID storage

system assigned to the mirrored virtual disks prior to resizing the mirrored virtual disks,

wherein the step of manipulating further comprises specifying a size of a virtual disk and

mapping the size of the virtual disk directly to all components of a mirror set, detaching

any RAIDs that extend beyond the specified size of the virtual disk, and truncating

RAIDs to free up any excess physical segments back into the RAID storage system;

resizing the at least one destination virtual disk before reporting a new storage size of the

source virtual disk; and providing the resized mirrored virtual disks for operation.

Bridge discloses receiving a request to resize a virtual disk, associating additional

storage with the virtual disk and reporting the new sizes users and more specifically,

resizing or changes the size of a logical unit are implemented before reporting a new

storage size of the source virtual disk (or logical unit); and reporting the new size of the

source virtual disk (or logical unit) **[expanding or shrinking logical volumes by adding**

or removing extents wherein when the logical volume is configured to a new size, the

new size is reported in logical volume directory; thus allowing I/O operations are

allowed on the logical volume (col. 16, line 32- col. 17, line 4; col. 20, lines 1-33)

wherein the added or removed extents may be mirrored (col. 17, line 5-col. 18, line

58)].

Lubbers and Bridge are analogous art because they are from the same field of

endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary

skill in the art to modify the system of Lubbers which provides source and destination

virtual disks in a copy set and resizes these virtual disks in an automatic fashion wherein

any changes to a source virtual disk are propagated to the destination virtual disk and

further explicitly perform changes of size of the copy set of source and destination virtual

disks of Lubbers and later reporting the size of the copy set or source and destination

virtual disks in the same manner that Bridge first resizes a logical unit and later reports

the changes to the logical unit by updating directory tables in order to allow I/O access to

the virtual disks, since Bridge discloses this provides the advantage of dynamically

accommodating to system requirement changes in a mirrored system configuration (col.

3, line 45-col. 4, line 59; fig. 9 and related text); however, the combination of Lubbers

and Bridge does not expressly disclose manipulating RAIDS in the RAID storage system

assigned to the mirrored virtual disks prior to resizing the mirrored virtual disks, wherein

the step of manipulating further comprises specifying a size of a virtual disk and mapping

the size of the virtual disk directly to all components of a mirror set, detaching any

RAIDs that extend beyond the specified size of the virtual disk, and truncating RAIDs to free up any excess physical segments back into the RAID storage system.

DeKoning discloses manipulating RAIDS in the RAID storage system assigned to the mirrored virtual disks prior to resizing the mirrored virtual disks, wherein the step of manipulating further comprises specifying a size of a virtual disk and mapping the size of the virtual disk directly to all components of a mirror set, detaching any RAIDs that extend beyond the specified size of the virtual disk, and truncating RAIDs to free up any excess physical segments back into the RAID storage system; as **[a LUN may be broken up into a plurality of partitions wherein "each partition retains its own configuration and mapping information. Each partition is therefore managed essentially as though a separate RAID LUN" (col. 4, lines 23-26) wherein each partition may grow or shrink in accordance to its capacity requirements (col. 7, lines 46-48) wherein when a partition is to shrink or be demoted, its RAID level configuration is manipulated to change from a RAID level requiring more space to one requiring less space (col. 7, lines 10-48) and any RAIDs or unused RAID space is detached and pooled in an unused space pool (col. 7, lines 29-48) and RAIDs are truncated so that the available partition space is changed from 20 MB in size to for example, 10 MB (col. 10, line 25-col. 11, lines 7) thus the unused space is freed up into the RAID system to the pool of unused space (col. 7, lines 29-48; col. 11, lines 3-7)]**.

Lubbers, Bridge and DeKoning are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the combined system/method of Lubbers and Bridge wherein mirrored virtual disks are resized and any changes to one member of a copy set consisting of a source and destination LUNs are automatically propagated to the other member to further perform said resizing in a manner such as that taught by DeKoning wherein RAIDs are manipulated prior to resizing a LUN and RAIDs are detached and truncated to free up space in the LUN since DeKoning discloses such approach would ensure **[provision of simpler techniques in manipulation of a LUNs and simplified dynamic adjustment of configuration of a RAID storage system to adapt to desired performance and utilization goals (col. 3, lines 52-55; col. 4, lines 57-61)]**.

Therefore, it would have been obvious to combine Lubbers with Bride for the benefit of creating a system/method of resizing virtual disks to obtain the invention as specified in claim 4.

19.   As per claim 7. (previously presented) A program storage device readable by a computer embodying in a tangible medium one or more programs of instructions executable by the computer to perform a method for dynamically shrinking mirrored virtual disks in a RAID storage system, the method comprising: specifying a size of a virtual disk and mapping the size of the virtual disk directly to all components of a mirror set; detaching any RAIDs that extend beyond the specified size of the virtual disk; and truncating RAIDs to free up any excess physical segments back into the RAID storage system **[The rationale in the rejection to claim 4 is herein incorporated]**.

20.   As per claim 10. (previously presented) An apparatus for dynamically resizing mirrored virtual disks in a RAID storage system, comprising: a storage system interface

for providing access to a storage system; host side interface for communicating with host

devices; and a processor, coupled to the host side interface and the storage system

interface, the processor being configured for receiving a request to dynamically resize

mirrored virtual disks in a RAID storage system, manipulating RAIDs in the RAID

storage system assigned to the mirrored virtual disks prior to resizing the mirrored virtual

disks, resizing the mirrored virtual disks, specifying a size of a virtual disk and mapping

the size of the virtual disk directly to all components of a mirror set, detaching any

RAIDs that extend beyond the specified size of the virtual disk, truncating RAIDs to free

up any excess physical segments back into the RAID storage system, and providing the

resized mirrored virtual disks for operation **[The rationale in the rejection to claim 4 is**

herein incorporated]; further requiring:

a storage system interface for *{interpreted as intended use, see MPEP 2106 II-C}*

providing access to a storage system; host side interface _for_ *{interpreted as intended use,*

*see MPEP 2106 II-C}*communicating with host devices; **[Lubbers discloses storage**

controllers 105 virtualize physical storage into logical units LUNs and hosts 102

access storage by addressing LUNs (col. 5, lines 51-67; fig. 1 and related text) via

for example, FC switch (301) (fig. 3 and related text)] and a processor, coupled to the

host side interface and the storage system interface, the processor being configured _for_

*{interpreted as intended use, see MPEP 2106 II-C}*receiving a request to dynamically

resize mirrored virtual disks in a RAID storage system **[Lubbers discloses storage**

controllers 105 virtualize each LUN, including resizing of LUNs (col. 5, line 51-col.

6, line 37) and are coupled to hosts 102 computers (col. 5, lines 27-62)].

21.   As per claim 13. (previously presented) A storage area network, comprising: a
plurality of hosts; at least one access device, coupled to the plurality of hosts, for
managing data input/output operations; and a storage platform, for providing networked
storage to the at least one access device, the storage platform including a management
device for dynamically resizing mirrored virtual disks in a RAID storage system, the
management device further comprising: a storage system interface for providing access to
a storage system; host side interface for communicating with host devices; and a
processor, coupled to the host side interface and the storage system interface, the
processor being configured for receiving a request to dynamically resize mirrored virtual
disks in a RAID storage system, manipulating RAIDs in the RAID storage system
assigned to the mirrored virtual disks prior to resizing the mirrored virtual disks, resizing
the mirrored virtual disks, providing the resized mirrored virtual disks for operation,
specifying a size of a virtual disk and mapping the size of the virtual disk directly to all
components of a mirror set, detaching any RAIDs that extend beyond the specified size
of the virtual disk and truncating RAIDs to free up any excess physical segments back
into the RAID storage system **[The rationale in the rejection to claim 4 is herein
incorporated]**; further requiring:

        A storage area network, comprising: **[Lubbers discloses storage area network
(SAN) (fig. 1 and related text)]** a plurality of hosts; **[hosts 102 (fig. 1 and related text)]**
at least one access device, coupled to the plurality of hosts, for managing data
input/output operations; **[host computers which may be any kind of computer or
processor performing input/output of data from storage devices on SAN (col. 5, lines
27-50)]** and a storage platform, for providing networked storage to the at least one access

device, the storage platform including a management device for dynamically resizing

mirrored virtual disks in a RAID storage system, the management device further

comprising: a storage system interface for providing access to a storage system;

[Lubbers discloses SAN including physical storage virtualized by controllers 105

into logical units LUNs, which also resize LUNs (col. 5, line 51-col. 6, lines 37)] host

side interface for communicating with host devices; **[Lubbers discloses storage**

controllers 105 virtualize physical storage into logical units LUNs and hosts 102

access storage by addressing LUNs (col. 5, lines 51-67; fig. 1 and related text) via

for example, FC switch (301) (fig. 3 and related text)] and a processor, coupled to the

host side interface and the storage system interface, the processor being configured for

receiving a request to dynamically resize mirrored virtual disks in a RAID storage system

[Lubbers discloses storage controllers 105 virtualize each LUN, including resizing of

LUNs (col. 5, line 51-col. 6, line 37) and are coupled to hosts 102 computers (col. 5,

lines 27-62)].

22.   As per claim 16. (previously presented) An apparatus for dynamically resizing

mirrored virtual disks in a RAID storage system, comprising: first means for providing an

interface to a storage system; second means for providing communication with host

devices; and means, coupled to the host side interface and the storage system interface,

for receiving a request to dynamically resize mirrored virtual disks in a RAID storage

system, manipulating RAIDs in the RAID storage system assigned to the mirrored virtual

disks prior to resizing the mirrored virtual disks, wherein the means for manipulating

further comprises means for specifying a size of a virtual disk and mapping the size of the

virtual disk directly to all components of a mirror set, detaching any RAIDs that extend

beyond the specified size of the virtual disk and truncating RAIDs to free up any excess

physical segments back into the RAID storage system, resizing the mirrored virtual disks,

and providing the resized mirrored virtual disks for operation **[The rationale in the**

rejection to claims 4, 7 and 13 is herein incorporated].

23.   **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Lubbers et

al. (US 6,880,052) in view of Bridge (US 6,530,035) and DeKoning (US 6,275,898) as

applied to claim 5 above, and further in view of Cabrera et al. (US 6,629,202).

24.   As per claim 5. (original) The combination of Lubbers, Bridge and DeKoning

discloses The program storage device of claim 4 but does not expressly disclose wherein

the specifying a size for the virtual disk and mapping the size of the virtual disk is

performed by an operating system.

Cabrera discloses specifying a size for the virtual disk and mapping the size of the

virtual disk is performed by an operating system as **[logical volumes are mapped and**

resized under the control of the operating system (col. 8, lines 59-67; col. 10, lines 4-

17; col. 11, line 50-col. 12, line 33)].

Lubbers, Bridge, DeKoning and Cabrera are analogous art because they are from

the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary

skill in the art to modify the combined system of Lubbers, Bridge and DeKoning to have

the operating system perform the specifying a size for the virtual disk and mapping the

size of the virtual disk as taught by Cabrera, since Cabrera discloses this would provide

dynamic volume resizing without system disruption.

Therefore, it would have been obvious to combine Lubbers with Bridge, DeKoning and Cabrera for the benefit of creating a system/method to obtain the invention as specified in claim 5.

ACKNOWLEDGMENT OF ISSUES RAISED BY THE APPLICANT

Response to Amendment

25.   Applicant's arguments filed on 5/15/09 with respect to claims **1-3, 9 and 17-24** have been considered but they are not persuasive.

26.   As required by **M.P.E.P. § 707.07(f)**, a response to these arguments appears below.

27.   The allowability of claims 4-5, 7, 10, 13 and 16 is herein withdrawn in view of newly cited prior art (See rejection of claims 4-5, 7, 10, 13 and 16 above).

ARGUMENTS CONCERNING PRIOR ART REJECTIONS

28.   Claims must be given the broadest reasonable interpretation during examination and limitations appearing in the specification but not recited in the claim are not read into the claim (See M.P.E.P. 2111 [R-1]).

29.   Applicant argues Lubbers does not disclose "increasing respective sizes of each of the at least one destination virtual disk before reporting a new storage size of the source virtual disk; and reporting the new size of the source virtual disk."

In response, these arguments have been fully considered, but they are not deemed persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections

are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871

(CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The combination of Lubbers and Bridge discloses "increasing respective sizes of

each of the at least one destination virtual disk before reporting a new storage size of the

source virtual disk; and reporting the new size of the source virtual disk" as **[Lubbers**

discloses "a copy set" is a set of member virtual disks where each member virtual

disk is a replica of the others" (col. 8, line 57-col. 9, line 8) wherein a LUN may be

resized and the resizing is automatically propagated to other members of the copy

set (col. 4, lines 44-67; col. 6, lines 5-37)] wherein Lubbers does not expressly disclose

the changes to the copy set or source and destination LUNs are done prior to reporting a

new size of the LUN or LUNs; however, Bridge discloses receiving a request to resize a

virtual disk, associating additional storage with the virtual disk and reporting the new

sizes users and more specifically, resizing or changes the size of a logical unit are

implemented before reporting a new storage size of the source virtual disk (or logical

unit); and reporting the new size of the source virtual disk (or logical unit) **[expanding or**

shrinking logical volumes by adding or removing extents wherein when the logical

volume is configured to a new size, the new size is reported in logical volume

directory; thus allowing I/O operations are allowed on the logical volume (col. 16,

line 32- col. 17, line 4; col. 20, lines 1-33) wherein the added or removed extents may

be mirrored (col. 17, line 5-col. 18, line 58)]. At the time of the invention it would have

been obvious to a person of ordinary skill in the art to modify the system of Lubbers

which provides source and destination virtual disks in a copy set and resizes these virtual

disks in an automatic fashion wherein any changes to a source virtual disk are propagated

to the destination virtual disk and further explicitly expand the size or perform changes of

size of the copy set of source and destination virtual disks of Lubbers and later reporting

the size of the copy set or source and destination virtual disks in the same manner that

Bridge first resizes a logical unit and later reports the changes to the logical unit by

updating directory tables in order to allow I/O access to the virtual disks, since Bridge

discloses this provides the advantage of dynamically accommodating to system

requirement changes in a mirrored system configuration (col. 3, line 45-col. 4, line 59;

fig. 9 and related text). Note that since resizing changes are automatically propagated to

members of the copy set they are interpreted to correspond to the resizing of a LUN as

taught by Bridge, wherein, after a LUN is resized, changes to the logical unit are reported

by updating directory tables in order to allow I/O access to the virtual disks.

30.   Regarding all other Claims not specifically traversed above and whose rejections

were upheld, the Applicant contends that the listed claims are allowable by virtue of their

dependence on other allowable claims. As this dependence is the sole rationale put forth

for the allowability of said dependent claims, the Applicant is directed to the Examiner's

remarks above. Additionally, any other arguments the Applicant made that were not

specifically addressed in this Office Action appeared to directly rely on an argument

presented elsewhere in the Applicant's response that was traversed, rendered moot or

found persuasive above.

31.   All arguments by the applicant are believed to be covered in the body of the office

action; thus, this action constitutes a complete response to the issues raised in the remarks

dated 5/15/2009.

CLOSING COMMENTS

Examiner's Note

32.   Examiner has cited particular columns and line numbers in the references as

applied to the claims above for the convenience of the applicant. Although the specified

citations are representative of the teachings in the art and are applied to the specific

limitations within the individual claim, other passages and figures may apply as well. It is

respectfully requested from the applicant, in preparing the responses, to fully consider the

references in entirety as potentially teaching all or part of the claimed invention, as well

as the context of the passage as taught by the prior art or disclosed by the examiner.

When responding to this Office Action:

12.   Applicant is requested to indicate where in the disclosure support is to be found

for any new language added to the claims by amendment. 37 C.F.R. § 1.75(d)(1) requires

such support in the Specification for any new language added to the claims and 37 C.F.R.

§ 1.83(a) requires support be found in the Drawings for all claimed features.

33.   Applicant must clearly point out the patentable novelty which he or she thinks the

claims present, in view of the state of the art disclosed by the references cited or the

objections made, and must also explain how the amendments avoid the references or

objections. See 37 C.F.R. § 1.111(c).

a. STATUS OF CLAIMS IN THE APPLICATION

34.   The following is a summary of the treatment and status of all claims in the

application as recommended by **M.P.E.P. 707.07(i)**:

a(1) CLAIMS REJECTED IN THE APPLICATION

35.   Per the instant office action, claims 1-5, 7, 9-10, 13 and 17-24 have received an

action on the merits and are subject of a non-final rejection.

b. **DIRECTION OF FUTURE CORRESPONDENCES**

36.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Yaima Campos whose telephone number is (571) 272-

1232. The examiner can normally be reached on Monday to Friday 8:30 AM to 5:00 PM.

37.   If attempts to reach the above noted Examiner by telephone are unsuccessful, the

Examiner's supervisor, Mr. Sanjiv Shah, can be reached at the following telephone

number: Area Code (571) 272-4098.

          The fax phone number for the organization where this application or proceeding is

assigned is 571-273-8300. Information regarding the status of an application may be

obtained from the Patent Application Information Retrieval (PAIR) system. Status

information for published applications may be obtained from either Private PAIR or

Public PAIR. Status information for unpublished applications is available through

Private PAIR only. For more information about the PAIR system, see http://pair-

direct.uspto.gov. Should you have questions on access to the Private PAIR system,

contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

July 31, 2009   /Yaima Campos/
                                                                Examiner, Art Unit 2185

/Hong Kim/

Primary Examiner, Art Unit 2185